The Early Royal Society and Visual Culture

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[Abstract] Recent studies have fruitfully examined the intersection between early modern science and visual culture by elucidating the functions of images in shaping and disseminating scientific knowledge**.** Given its rich archival sources, it is possible to extend this line of research in the case of the Royal Society to an examination of attitudes towards images as *artefacts* –manufactured objects worth commissioning, collecting and studying. Drawing on existing scholarship and material from the Royal Society Archives, I discuss Fellows' interests in prints, drawings, varnishes, colorants, images made out of unusual materials, and methods of identifying the painter from a painting. Knowledge of production processes of images was important to members of the Royal Society, not only as connoisseurs and collectors, but also as those interested in a Baconian mastery of material processes, including a "history of trades". Their antiquarian interests led to discussion of painters' styles, and they gradually developed a visual memorial to an institution through portraits and other visual records.

Introduction

In the Royal Society Library there is a manuscript (MS/136) entitled "Miniatura or the Art of Lymning" [2] by Edward Norgate (1581-1650), who was keeper of the King's musical instruments, Windsor Herald, and an art agent for "the collector Earl", Thomas Howard, Earl of Arundel (1586-1646) (Norgate 1997, pp. 1-9). Two versions exist of Norgate's "Miniatura", the first of which was

written for his friend, Sir Theodore Turquet de Mayerne (1573-1655), and a second, expanded treatise was dedicated to his patron's son, Henry Frederick Howard, the third Earl of Arundel (1608-1652), also an art connoisseur. The Society's manuscript dated 19 July 1657 is a copy of the second version, and was part of a substantial bequest to the Society in 1673 by Henry Frederick's son, Henry, then Earl Marshal and later Duke of Norfolk, at the encouragement of John Evelyn (Peck 1998). Though Norgate had attended John Pell's inaugural lecture in Breda (Pell 2005, pp. 125-27), his interest in scientific matters appear to have been limited. A manuscript on drawing and limning by a courtier of the late King might suggest only a tangential relevance to the Royal Society dedicated to improving natural knowledge. Yet, Norgate's treatise was owned in manuscript form by Fellows of the Royal Society such as Nehemiah Grew, Elias Ashmole, Ralph Thoresby, and Thomas Kirke (Norgate 1997, pp. 217-21; Kusukawa 2012), even after part of "Miniatura" became widely available through William Sanderson's unacknowledged use of it in his *Graphice* (1658). The Royal Society's copy was likely the source for the section on drawing in John Evelyn's *Sculptura* (1662) (Norgate 1997, p. 18). Norgate's discussion of pigments was of interest to chymically inclined connoisseurs like Mayerne (Norgate 1997, pp. 256-58; Keller 2018), and was a source about technique for the Society's history of trades (Norgate 1997, pp. 18-19). The presence of Norgate's manuscript in the Royal Society Library is a useful reminder, therefore, of its members' interests in the process of and material for creating images.

Recent scholarship has drawn attention to the role of images in the scientific investigation and communication of the Royal Society by focusing on

those members who were graphically proficient or were well-known connoisseurs of the visual arts. For example, Robert Hooke knew the miniature painter John Hoskins, learned drawing from another miniaturist Samuel Cooper, and had apprenticed with the portraitist Peter Lely (Aubrey 2015, 1: 96-97). His work has naturally attracted the attention of art historians: Meghan Doherty (2012) has argued how print culture provided the visual vocabulary for Hooke's *Micrographia*, and Matthew Hunter (2013) has drawn attention to the artistic and material "intelligence" which informed Hooke's empirical methods in science. Although Christopher Wren later relied on a group of draughtsmen for his architectural work (Geraghty 2007, pp. 8-14), he made novel use of the graphic conventions of practical geometry when encoding his own hypothesis of the motion of a comet into a diagram (Johnston 2010), and he may have used a perspective instrument designed by himself (Bennett 1982, pp. 74-76) to draw directly onto copper plates (Flis 2012) the parts of the brain dissected by Thomas Willis (1664). In addition, Richard Waller, a less well-known Fellow who was likely trained by his miniaturist mother, and the Society's operator Henry Hunt who was trained by Hooke, have been identified as key individuals who generated drawings for the Society's meetings and publications (Kusukawa 2011; Kusukawa 2014a, Reinhart 2019). John Evelyn, a collector of prints and paintings who could also etch (Griffiths 1993), helped establish the earliest visual profiles of the Society: he was involved in designing the Society's coat of arms (Hunter 1989, pp. 17, 41-2), and re-purposing Nicolas Chaperon's print into a symbolic image of the Royal Society which eventually adorned Thomas Sprat's apology for the institution (1667) (Hunter and Bennett 2017).[3]

Not all Fellows of the Society could draw, however. The physician Edward Tyson relied on Hooke, Hunt and Waller, as well as on William Faithorne the Elder, who made some pastel drawings of his anatomical studies (Montague 1943, pp. 136-44, 152-57, 216-24; Kusukawa 2014a). Walter Charleton was offered Hooke's help in drawing anatomical objects (Birch 1756-1757, 1: 287, 404). William Lodge, an amateur etcher and draughtsman (Griffiths 2004c; Pierce 2016) and his friend Francis Place (Tyler 1971) did some of the drawings for Martin Lister's papers submitted to the Royal Society (Roos 2011b, pp. 175-78, 275-76), while Lister's own daughters drew or engraved images for his study of shells (Woodley 1994; Roos 2011a). Katherine Molyneux, wife of the Fellow Thomas Molyneux, and sister of Hugh Howard, the Irish portrait painter, collector and also a Fellow (Lauze 2004), made drawings accompanying her husband's papers that were sent to the Royal Society (Hoppen 2008, 1: 266n6, 314n11) [Fig. 1. Fig. 1. Drawing of basalt columns from the Giant's Causeway in Ireland, with a scale, signed in the bottom right corner, "M^{rs} K[atherine] M[olyneux] del[ineavit]." 1698. Ink and wash on paper 202 x 317 mm. This drawing is a copy of a section of the watercolour drawing done by Edwin Sandys (d. 1708) of the Giant's Causeway at the behest of the Dublin Philosophical Society (1697). EL/M1/105/017, RSA. (photo: Royal Society)]. Fossils for Edward Lhuyd's study were drawn and signed by one William Jones in 1698 [Fig. 2: Drawing of "figured stones" signed at the bottom right, "Gul[ilemus] Jones del:[ineavit]". Ink, grey wash, and red pencil on paper, 306 x 189 mm. This was printed in *Philosophical Transactions* vol. 20 no. 243 (1698). Cl. P/9i/52/005, RSA. (photo: Royal Society)], but Jones's name did not appear on the illustration of the paper printed in *Philosophical Transactions*,

where Lhuyd referred to his "designer" without naming him as one who had "never practiced before his journey, but seems to improve daily" (Lhuyd 1698, p. 280).[4]

Several, though not all, drawings that survive today in the Royal Society Archives were printed in *Philosophical Transactions*.[5] The journal's relationship with the institution was neither clear-cut nor stable while its financial responsibility rested with the Society's secretary (Moxham 2015), but its readers began to associate the journal with the institution itself. It was the secretary who made editorial decisions, but we still know very little about who was involved in re-drawing [Fig. 3. Drawing of pieces of bone extracted from the heart of the Charles Lindsay (1650-1662), the second Earl of Balcarres, by Robert Hooke, 1663. Ink and grey-wash and grey body colour on a piece of paper, 350 x 230 mm, glued on to the page of the Society's Register Book. RBO/2i/290, RSA. (photo: Royal Society).] and transferring the original sketches for engraving, who engraved or corrected the plates, and how much the illustrations cost for *Philosophical Transactions.* Despite the fact that it was more expensive than woodcuts, engraving was the preferred medium for the journal, which may also have been due to the fact that "the Plague swept away all those that cutt tolerably in wood", as the mathematician John Collins remarked (Newton 1959-1977, 1: 55-56). After the first signed engraving by Faithorne of the map of the Canal du Midi in 1670, none of the plates in *Philosophical Transactions* were signed until the years under the editorship of Francis Aston (Gunther 1939, pp. 13-127), when the illustrations were produced in Oxford. Several of these were signed by Michael Burghers, the future engraver to the University, and by John Savage, most likely

Burgher's apprentice (Griffiths 2004a and 2004d, Feola and Mandelbrote 2013, p. 335). For the illustrations of the financially ill-fated *Historia Piscium* (Bluhm 1958, pp. 98-100), the Society paid sundry engravers active in London at the time (Kusukawa 2000). Although the Society had the right to appoint its own engraver or "chalcographer" (Foster and Rücker 1897, pp. 28, 41), it never did so in its early years,[6] probably because London had a ready supply of craftsmen as it did of instrument makers who could provide invaluable services to the Society if and when they were required (Iliffe 1995). Through the journal with which it was closely associated, and a publication in which it was directly involved, the Royal Society thus offered occasional gainful employment to engravers. This role of the Society was somewhat stretched in 1674 when William Petty nominated the painter and etcher Francis Barlow as an agent for the Society to gather Fellows' arrears (Birch 1756-1757, 3: 142, 175). Petty had named Barlow earlier to draw the "schemes" for his history of clothing (Birch 1756-1757, 1: 16), and Barlow was certainly known to other Fellows such as Evelyn,[7] John Ray and Francis Willughby (Flis 2015), but collecting late subscriptions hardly demanded Barlow's skill as "picture-drawer". This nevertheless indicates a Fellow's willingness to support a struggling painter through the Royal Society.

Images were deemed particularly useful for scientific knowledge because of their ability to document and substitute for objects of investigation (Daston 2015). This was certainly the case at the Royal Society, especially of drawings of objects that were exotic, ephemeral or complex, such as flora and fauna from Java Major or China (Birch 1756-1757, 2: 314); oddly shaped hail (Birch 1756-1757, 2: 162); or an instrument claiming to square the circle.[8] Drawings were also made of

objects which their owners did not wish to part with, for instance the pieces of bone extracted from the heart of Charles Lindsay (1650-1662), Earl of Balcarres (Birch 1756-1757, 1: 292, 294)[9] [Fig. 4. Diagram in graphite showing Denis Papin's design of Hessian bellows prepared for *Philosophical Transactions* vol. 24 no. 300 (1705), in which the letters inscribed in ink have been reversed. Draughtsman unknown. This is an intermediate drawing used to trace onto the copper plate so that the letters will print in the correct orientation. Paper, 110 x 190 mm. MS/131/187, RSA. (photo: Royal Society)] or a tooth taken out of the ovary of a woman (Grew 1681, p. 8). A focus on the object depicted is also characteristic of the references we find in the Royal Society's records to paintings or prints. Plot mentioned a painting in the library of Brasenose College, Oxford, which showed the "giant child" from Hale (Birch 1756-1757, 4: 425) for example, and a print of Trajan's column was brought in to the Society as evidence for the structure of an ancient galley ship.[10]

At the meeting of 24 March 1686, Petty presented a paper about navigation, after which John Aubrey mentioned "a set of draughts of six sheets, representing the manner of several sea fights, done by Mr Hollar", which were ordered to be procured for the Society (Birch 1756-1757, 4: 468). Here again, it appears that Wenceslaus Hollar's prints were cited for what they portrayed – the sea fights – rather than for the composition or execution of the print. But the fact that they had been drawn by Prince Rupert who led the battle (and who was also Fellow of the Society) and then etched by a gentleman-artist favoured by Evelyn must have made the prints particularly worthy of attention and trust by the members of the Royal Society.[11] Aubrey had noted that because of his poor

eyesight, Hollar used a magnifying glass for his work and that "the curiosity of his worke is not to be judged without a magnifying glass" (Hollar 2009-12, 9: xl; Flis 2012, p. 155), but there is no record that members of the Society subsequently saw Hollar's prints of the naval battles or that they used a magnifying glass to study them. This is a rare, documented case where a print carried weight because of its maker, whereas the reliability of images was often subsumed under the more general concern about the reliability of reports of objects or events which members of the Society had not the chance to observe or verify directly (Lyon 2017). It is in fact relatively rare to see draughtsmen or engravers invoked as witnesses at the Royal Society, except in the case of Leeuwenhoek, which may have to do his perception of his status and the distance from London (Fransen 2019).

There was another sense in which images were important to the Royal Society, namely as *artefacts,* or objects whose materiality, manufacturing process, or makers were of interest to the Society's members. This will be the focus of this paper. In a period where art and architecture gained renewed centrality at the court, city and country (Harris 1979; Cowan 1998; Ormrod 1998; Gibson-Wood 2002 cf. Stephens 2016; Hallett et al. 2016), it is not surprising that several Fellows of the Royal Society were collectors as well as commentators on art (Salerno 1951, pp. 246-48, 251; Hanson 2009). Indeed, Cowan (2004) has suggested that in the absence of a Royal Academy of Art in England, the Royal Society became the institutional platform for connoisseurial considerations of art of the period. While a virtuoso like Evelyn may well have harboured hopes that the Royal Society function like the Royal Academy of Painters and Sculptures in

Paris (Hunter and Bennett 2017, p. 50), not all of his virtuosic interests (Hunter and Harris 2003) found outlet at the Royal Society. Thus a case will need to be made in each instance as to whether views of individual members of the Society can be imputed to the Society itself (Hunter 2011). The two English "translations" of Charles Alphonse du Fresnoy's Latin poem *De arte graphica* by William Aglionby and by John Dryden are a case in point. Aglionby published his translation, *Painting Illustrated* (Hanson 2009, pp. 94-108), with a dedication to the Earl of Devonshire, William Cavendish, who was also an original Fellow of the Royal Society. Yet Cavendish was barely active as Fellow and was expelled from the Society for failure to pay subscription fees in 1685 (Hunter [1982] 1994, pp. 140-41), the year Aglionby published his book. It is thus not obvious that this book represents their shared interest about paintings as Fellows of the Royal Society. Moreover, although Dryden's translation of *De arte graphica* (1695) has been credited with supplying Johnson's dictionary with English expressions of beauty (Wimsatt 1951; Levine 1999, pp. 101-104), there is little direct evidence to connect this publication to the activities of the Royal Society, of which Dryden was only briefly a member (1662-1666) (Hunter [1982] 1994, pp. 110, 158-59).[12]

Yet, individuals and the institution were not quite separable. As I will be pointing out below, interests and backgrounds of Fellows were reflected in the topics that were discussed and pursued in the Society's weekly meetings, the committees to which they were assigned, and the papers printed in *Philosophical Transactions.* Though the extent to which the character of the early Royal Society may be credited to Francis Bacon alone must be carefully assessed (Anstey 2012, Lynch 2016), it certainly exhibited a keen interest in Bacon's natural history

(Hunter 2007), and its history of trades to benefit King and Country was indebted to programmatic statements by Bacon (Houghton 1941; Ochs 1985). For Bacon, history of trades was part of history of nature "wrought", which would radically transform natural philosophy for the benefit of humanity (Houghton 1941, p. 35).[13] This embodied Bacon's view of knowledge as at once general and operative.[14] Knowledge of the "true" form of a given nature (such as a yellow colour or heat) was identical to the ability to "superinduce" it on *any* given body (*Novum organum,* book 2, aphorisms, 3-5, Bacon 2004, pp. 200-205), and bring about effects that have "never been done before". It is in these contexts that attitudes of the members of the Royal Society towards images as artefacts should be assessed, rather than by any aesthetic standard of fine arts of a later period (Gibson-Wood 1997; Sloan 2015, pp. 381-85).

Drawing on existing scholarship and on material from the Royal Society's archives, this essay offers an overview of the range of attitudes towards images as artefacts. I first discuss the works of John Evelyn, the earliest and most vocal advocate of the importance of the visual in the form of prints, drawings and paintings. His example shows how knowledge of the process of producing images was important for the collector as well as for the project of history of trades. Thomas Povey, another art enthusiast, was the impetus behind a history of the art of painting at the Royal Society, and though the project did not come to fruition, his was one of several examples, as I will discuss in the second section, of interest in the material aspects of making images among members of the Society. The third section draws attention to another strand of interest – palaeography – which resulted in Humfrey Wanley's discussion of methods for identifying painters'

hands. As with most topics tackled at the meetings of the Royal Society, these developments reflected individual interests and initiatives. In the case of one group of images, however, what began as individual acts of donating portraits came to serve the Society as a whole, as will be discussed in the final section.

1. Evelyn on prints, drawings and paintings

As is well known, Evelyn built his virtuoso collection of prints, paintings, and other things during his Continental Tour and years of exile in France (Chaney 2003). He was also part of the circle of the collector, Thomas Howard, Earl of Arundel (Howarth 1985), who commissioned from his librarian, Francis Junius, a book on the *Paintings of the Ancients* (Weststeijn 2015, Junius 1991). On returning to England in 1652, Evelyn came within Samuel Hartlib's ambit, and through the encouragement of Robert Boyle, began to be interested in the history of trades (Hunter 1995**,** pp. 74-81).[15] Evelyn submitted his "history of arts illiberal and mechanic" to the Royal Society in early 1661 (Birch 1756-1757, 1: 10, 12),[16] which grouped various skills and crafts into a hierarchy ranging from "mean" or "servile" trades to the "polite and more liberal" or "curious" arts, and "exotic and very rare secrets".[17] Engraving and etching were listed under the "curious" arts and Prince Rupert's "new way of engraving" (mezzotint) under the most refined category of "exotic and very rare secrets" (Hunter 1995, pp. 66-98).

Evelyn's *Sculptura* (1662), dedicated to Boyle, and presented to the Royal Society on 11 June 1662 (Birch 1756-1757, 1: 85) is the first tract on the history of printmaking (Griffiths 2003, p. 107) and contains the first description in print (albeit brief) of the mezzotint technique credited in England to Prince Rupert

(Thomas 2010). Evelyn's own collection of prints served as the basis of his work: his emphasis on a print's edifying subject-matter rather than the fame of the print-maker reflected the arrangement of his own collection of prints (Griffiths 2003, pp. 109-12; Cowan 2004, pp. 160-63, 170-71). Evelyn intended his *Sculptura* to include a section on the techniques of print-making based on Abraham Bosse's *Traicté des manieres de graver en taille douce sur l'airin par le moyen des eaux fortes, & des vernix durs & mols* (1645), which was abandoned because he discovered that the engraver William Faithorne the Elder (Griffiths 2004b) was already working on a translation, *The Art of Graveing and Etching* (1662) (Birch 1756-1757, 1:15; Stijnman 2012, pp. 419-20, 452-3). In spirit, *Sculptura* and *The Art of Graveing* went together – Evelyn shelved them side by side in his library, and others bound them together (Griffiths 2003, p. 106). Though the section on print-making techniques was thus omitted from *Sculptura,* Evelyn argued that knowledge of such techniques helped the collector distinguish between prints and their copies, since it was impossible to imitate every hatch or the exact dimensions of each stroke, and flaws in the plate and the composition of the aqua fortis could not be replicated exactly (Evelyn 1662, p. 129). As a collector, he collected prints in different states in the knowledge that the ones without the lettering were the earliest and thus the best impressions (Griffiths 2003, p. 100). Knowledge of the print-making process was thus doubly useful for a Fellow who was interested in the history of trades and who was also a discerning collector.

Sculptura also included a section on the art of drawing as a foundation for engraving. "Designing", according to Evelyn, was "the very life" of engraving (Evelyn 1662, 100; Norgate 1997, p. 203n282). Its nobility was confirmed by a

comment by Thomas Howard: "one who could not designe a little, would never make an honest man" (Evelyn 1662, p. 103).[18] Though Evelyn acknowledged the distinction between design as "things not yet appearing, but the picture of ideas only", and drawing as related to copying and to "things already extant" (Evelyn 1662, p. 118),[19] he tended to use the words interchangeably, and extolled the value of drawings as collectable objects. The ability to draw was a praiseworthy virtue for authors of scientific subjects also, as Evelyn cited the examples of John Blagrave (in *Mathematical Jewel*, 1585) and Johannes Hevelius (in *Selenographia*, 1647) as both having drawn and cut the diagrams in their works (Evelyn 1662, p. 133).

In his explanation of the significance of drawing, Evelyn drew on Norgate. In the second version of "Miniatura", Norgate had added that the direct study of nature was necessary alongside the painter's "fancy" when painting landscapes (Norgate 1997, p. 169).[20] The key feature of an accomplished landscape, according to Norgate, was nothing other than "deceptio visus", a kind of "cousning and cheating your own eyes by your own consent" with an appropriate accommodation of colour, light and shadow (Norgate 1997, p. 87). On viewing a life-size perspectival picture of the Arch of Constantine in Cardinal Richelieu's garden, Evelyn had used a similar expression to describe his experience: an "agreeable cheate" (27 February 1644, Evelyn [1955] 2000, 2: 110; Houghton 1942, p. 210). Norgate had described the ability of drawing to produce such an effect thus:

> For the Pen I preferred it before all others whatsoever the end of all drawing being nothing else but soe to deceave the Eyes, by the deceiptfull

> judging and witchcraft of light and shadowes, that round embost, and sollid bodyes in Nature, may seeme round embost and sollid in *Plano* (Norgate 1997, pp. 105-6).

In *Sculptura,* Evelyn wrote:

> The pen is therefore both the first and best instructive … when it so deceives the eye by the Magic and innocent witch-craft of lights and shades that elevated and solid bodies in Nature, may seem swelling, and to be embossed in Plano by Art' (Evelyn 1662, p. 107).

Evelyn's gloss of the word "witchcraft" with "innocent" (Norgate 1997, p. 204n286) suggests that he regarded the effect of modelling with the pen as something positive.[21] Mimetic qualities of an image that could "deceive" a viewer goes back, through the Renaissance, to the classical legends of Zeuxis and Parrhasius (McHam 2013; Kusukawa 2014b; Batchelor 2016, pp. 340-41). It is an experience that Pepys too would record in striking terms in his diary when he saw a painting by a newly arrived Dutch painter, Simon Verelst, who

> did show us a little flower-pott of his doing, the finest thing that ever I think I saw in my life – the drops of Dew hanging on the leaves, so as I was forced again and again, to put my finger to it, to feel whether my eyes were deceived or no (11 April 1669, Pepys 1970-1983, 9: 515, Liedtke 1991, p. 230; Batchelor 2016, p. 335).

In order to create such an effect of modeling, or "the sensation of Relievo or extancies" Evelyn suggested using an instrument for "constant and regular certitude" (Evelyn 1662, pp. 118-19). This was a frame with stretched parallel cords that would cast shadows on an object along the contours of the object.

Tracing those lines would help create the impression of relief on paper or a plate (Evelyn 1662, pp. 118-24). This method, dubbed "perspective parallelism" (Evelyn 1662, p. 123) by Evelyn, had been developed by Robert Nanteuil (from whom Evelyn had commissioned his portrait while in Paris), and publicized in Bosse's discussion of techniques in *Moyen universel de pratiquer la perspective sur les tableaux et surfaces irrégulières* (1653) (Thomas 2012, pp. 31-32). This further confirms Evelyn's attentiveness to the process of drawing.

Evelyn ended *Sculptura* by extolling the usefulness of images for children's education by pointing to several published works which advocated the same point: Louis Couvay's *Methode nouvelle et tres-exacte pour enseigner et apprendre la premiere partie de Despautaire* (1649), a set of images engraved by Louis's relative Jean Couvay, designed to teach Johannes de Spater's grammar;[22] Eilhard Lubin's letter to Philip II, Duke of Pommern–Stettin, which recommended the use of images to teach Latin and German to children, printed by Hartlib in *True and readie way to learn the Latin tongue* (1654); and Johannes Amos Comenius' *Orbis sensualium pictus*, though Evelyn criticized the engravings as poor in the edition with Charles Hoole's translation (Comenius 1659; Evelyn 1662, p. 139).[23] A picture was "a kind of Universal Language", according to Evelyn, and could express at a glance things that words could not, such as plants, birds, beasts, fishes, buildings, and monuments (Evelyn 1662, p. 140; Norgate 1997, p. 216n327). Such a didactic use of prints could be extended to create a visual archive of knowledge. Evelyn cited the collection of prints by Michel de Marolles, Abbot of Veilleloin, as "a kind of Encyclopedia of all intelligible and memorable things that either are, or have ever been in rerum Natura" (Evelyn 1662, p. 141).

Although the Royal Society appears to have compiled a "book of drawings" (Kusukawa 2011, p. 286), a visual "encyclopedia" formed out of prints was not something that came to fruition.[24]

In 1668, Evelyn published a translation of Roland Fréart's *Idée de la perfection de la peinture* (1662), dedicated to Henry Howard. According to Fréart, principles of beauty were to be studied (Thomas 2012, p. 29) through the individual examples of paintings, which he called "ocular demonstrations"[25] (Evelyn 1668, pp. 118-19), and it was assumed that readers would have prints of well-known paintings such as Raphael's *Academy of the Athenian Philosophers* (Thomas 2012, p. 29). Fréart had divided the five elements of painting established by Junius into the "more spiritual and refined" part involving invention and expression, and the "more mechanical" part of proportion, colouring, and perspective. An author and collector but not a practitioner, Fréart sought to elevate the art of painting to a liberal profession by emphasising the parts involving the intellectual faculties of the painter at the expense and near exclusion of the work of graphic artisans, or "mechanics" (Posner 1993, pp. 583-84, Thomas 2012, p. 29). The printing of Evelyn's *An idea of the perfection* had been supervised by the Society's secretary, Henry Oldenburg, who also reviewed it (Hunter and Bennett 2017, p. 50) in *Philosophical Transactions,* and recommended it to "a Philosophical Traveller, an Architect, and every ingenious Mechanician" (Oldenburg 1668, p. 785), namely those keen to exercise their intellectual faculties. Yet Evelyn's translation was not always faithful to Fréart's text, as he decided to correct the latter's interpretation of a single vanishing point in Raphael's painting by incorporating Bosse's criticism in his *Le Peintre converty aux*

précises et universelles regles de son art (1667), which emphasised the importance of practical experience in making pictures to the connoisseur (Posner 1993, p. 592). Evelyn as a translator willing to correct a theorist with a practitioner's insight is consistent with the attentiveness to the practical side of print-making he had shown in *Sculptura.*

It must have been under Evelyn's influence that Oldenburg further reported on French works on paintings in *Philosophical Transactions*. Oldenburg (1666) offered a summary of André Félibien's *Entretiens sur les vies et sur les ouvrages des plus excellens peintres, Anciens et Modernes*, and translated (1669) an account from the *Journal des Sçavans* (18 March 1669: 13-17) of Félibien's *Conferences de l'academie Royale de peinture et de sculpture.* Like Fréart, Félibien emphasised the intellectual aspects of painting, deeming the brushwork of a painter as no more significant than writings in which philosophical ideas were expressed (Posner 1993, 583n3). Oldenburg also introduced the work of another member of the Royal Academy of Art, Gregoire Huret's *Optique de portraiture et peinture* (1670) as helpful for dinstinguishing the proper rules of perspective from the "false and imperfect ones" (Oldenburg 1672, 5048). Huret's tract was in fact a criticism of the craft-orientated work of Bosse, who had been ejected from the Academie by Charles LeBrun and others who were intent on elevating the status of painting (McTighe 1998).

Evelyn himself did not slavishly follow the French Academicians, as his use of Bosse's works suggests. The connoisseurial collector was also a Fellow of the Royal Society. A discerning collector needed to know the process of production in order to know what to collect, distinguish a copy from the original, and build

knowledge empirically of a history of prints and of the principles of painting. A Fellow of the Royal Society engaged in a history of trades needed to understand the manufacturing techniques of artisans and craftsmen. In this respect, connoisseurial expertise and Baconian knowledge coalesced in their common focus on understanding production processes. This is a trait that can be detected further among other Fellows of the Royal Society in relation to their interests in varnishes, colourants and unusual images.

2. Material Aspects of Images

The art of painting was recognized by both Evelyn and Petty as one of the arts to be considered under the "History of Trades", which in turn was one of the eight areas in which committees were set up by the Society to encourage collective research (Hunter 1989, pp. 73-121). A call for "a history of the art of painting" came from Thomas Povey, who was not one of the thirty-five Fellows appointed to the committee on "History of Trades", but he was a keen collector of paintings (Murison 2004).[26] Although this episode has been noted by several scholars already (Hanson 2009, p. 92; Hunter 2013, pp. 98-101; Hunter and Bennett 2017, p. 50;), it is worth rehearsing some of the details to indicate the convergence of interests among Fellows with different backgrounds.

Povey, a royal administrator and entrepreneur in colonial trade, is known to have been one of the earliest patrons of Samuel van Hoogstraten (Brusati 1995, pp. 92-93, 201; Batchelor 2016, pp. 345-46); he also owned at least one landscape by Robert Streater, Serjeant Painter to the King (Thackray 2004), and another by Hendrik Danckerts (Bird and Clayton 2017, pp. 112, 204-5). Their paintings at

Povey's house in Lincolns-Inn-Fields impressed visitors such as Evelyn and Pepys.[27] Either at his home or at Streater's studio, Povey noticed how the painter had mixed cuttings from a fig tree with eggs to create a medium for his painting. When he mentioned this in passing at a meeting of the Royal Society in April 1666, members present seemed dubious of this procedure, and thus Povey suggested a visit to Streater (Birch 1756-1757, 2: 84). On the morning of August 8, 1666, a group comprised of Lord William Brouncker (the president), Sir Robert Moray, Henry Slingsby, Walter Charleton, Robert Hooke and Povey, duly visited Streater's house (Birch 1756-1757, 2: 107). There, Robert Moray broke eggs into two small vessels and two small pieces of a fig tree were mixed into one vessel. The presence of the two vessels suggests a controlled experiment, to confirm that the change of texture was the result of the mixing of the fig. At some point it must have been established by asking the painter that any part of the fig tree would have the same effect: the fig reduced the eggs to an "oily" substance without "ropiness", yet was ductile "like oil", and when mixed with any colour, it lost its own colour, which was an important property for a medium. The advantage of this medium was that it did not create a glare when looked at directly, or yellow over time. As proof of its effect, the party went to Povey's house and viewed a chimney piece of a landscape by Danckerts. That afternoon, Brouncker reported on the morning's proceedings.[28] Streater's recipe had been subjected to an approach familiar to members of the Royal Society: control experiment (two vessels), generalisation (all parts of the fig tree), and confirmation of result (Danckert's painting which did not create a glare), observed by a group of people and then reported to the Society. Povey naturally felt vindicated, and suggested two weeks later that

Streater, Lely, and Cooper may "not be unwilling" to communicate "several curiosities and varieties of painting" (Birch 1756-1757, 2: 111). Although the list of paintings drawn up towards the end of his life does not name their makers, Povey must have had extensive contacts with painters in London who could offer portraits, still lives, landscapes and history paintings.[29]

In December 1667, Povey recounted to the Society the visit to Streater's studio, with a fuller description of the fig recipe (Birch 1756-1757, 2: 227-30). By then he had noticed that the recipe was probably "as ancient as the emperors" and added that Danckerts had seen the technique used on a "large cabinet in the pope's palace" in Italy (Birch 1756-1757, 2: 228; Hunter 2013, p. 99). Yet, Povey extolled the value of this medium by claiming that some paintings by Antonio da Correggio finished in this manner were considered "jewels" in the "rich collection his late Majesty had of that best paintings" (Birch 1756-1757, 2: 228).[30] He then suggested the desirability of an "entire history" of the "several uses of colours and the mediums by which they are applicable" (Birch 1756-1757, 2: 229). Such a work, Povey noted, had not yet been undertaken, because what had been written by painters "shew that their pen hath not been so good as their pencil (brush)" and what had been undertaken by those who thought about them had not consulted those practitioners who were "competently and aptly learned and more adequate to the work of assisting and informing" (Birch 1756-1757, 2: 230). He proposed a history of the arts of painting collected from "the several persons of ingenuity, who have particularly studied, practiced and experimented them", which would then be "re-examined and attested" by the Society (Birch 1756-1757, 2: 230). A painter's recipe which piqued the interest of a collector had thus

triggered a full-scale proposal for a Baconian investigation into the art of painting which required Fellows to consult suitable practitioners.

The Society appointed Povey, Evelyn, Hooke, Thomas Henshaw, Sir Theodore de Vaux, William Croone, Edmund Wylde, John Hoskyns, and Sir Philip Carteret to pursue such a scheme (ibid). Apart from Carteret and de Vaux who had been elected later and Povey who belonged to another committeee, the rest of the Fellows assigned to the task were also members of the Committee for the "History of Trades" (Birch 1756-1757, 1: 407). We have little information about Carteret's personal views (Hunter [1982] 1994, pp. 170-71; Hunter 1989, pp. 163, 171), but the rest of the committee members had relevant interests. We have already noted Hooke's graphic background and Evelyn's connoisseurial interests in the visual arts. Evelyn's travelling companion, Thomas Henshaw, shared his friend's interest in paintings (Griffiths 1992), and was also interested in chemical matters (Dickson 1997, Agnew 2012). That Henshaw had more than a passing interest in paintings is shown by the fact that when in 1694, the Society acquired a copy of Junius's *De picturis veterum,* Henshaw borrowed it and reported that the book was "a most excellent collection of all things extant in any author relating to the painting of the Ancients."[31] Edmund Wylde, Aubrey's patron with wide-ranging interests (Aubrey 2015, 2: 1688-94), explained how a varnish could spoil a painted sarsenet, and brought in another type of varnish for Hooke to use on painted taffeta (Birch 1756-1757, 2: 412, 469). He was also a collector, as his residence at Bloomsbury contained "paintings", "pictures", "enamelled pictures", "cups and vessels of crystal or of stone of any sort of stone", and "shells of all sorts."[32] John Hoskyns was chairman of both the legal committee and the

committee to collect natural phenomena (Hunter 1989, pp. 104-5), and an active contributor to the Society's activities. He gave stones and ores to the Society's repository (Grew 1681, pp. 314, 318-19, 330-31), which may suggest some familiarity with pigments, since he also noted the use of "mineral" colours for glass painting (Birch 1756-1757, 4: 458).[33]

Physicians, by profession, had interest in pigments, since material for medicine could also be used as pigments.[34] Thus, the physician William Croone reported on an "alkermes", an excrescence from the wood or leaves of the shrub "Ilex baccifera aquifolia", used at Montpellier as both medicine and pigment (Croone 1666). He also offered to bring in recipes for making verdigris and whitening wax (Birch 1756-1757, 2: 116). Physicians were also traditionally art enthusiasts and collectors, which helped them move among noble collectors and cultural elites who were potential clients (Landolt 1972; Hanson 2009).[35] Sir Theodore de Vaux, physician to Charles II, appears to have been a collector, as his will mentioned chimney pieces, paintings in the dining room and in "the gallery", watercolours of Charles II, the Duke of Norfolk, Lord and Lady Nottingham, the Duke of Mommouth, the Duchess of Portsmouth, de Vaux's mother, of himself after a portrait by Kneller, and a small picture of his niece.[36] More significantly, as Theodore de Mayerne's godson (Trevor-Roper 2006, p. 365), de Vaux had access to Mayerne's manuscripts, several of which pertained to medical and chemical topics and were introduced to the Royal Society (Keller 2018). A month after Povey had first mentioned the fig-juice distemper, de Vaux produced Mayerne's papers on dyeing practices in England and Holland, and a committee was set up to translate them (Henderson 2013, p. 108), with a view to compiling a history of

dyeing. De Vaux also promised to find out about the art of enameling by Jean Petitot, patronized by Charles I and Mayerne (Chaney 1980; Trevor-Roper 1993, pp. 274-76). Most of those nominated to Povey's committee on the history of painting thus had relevant and continuing interests in the art of painting, pigments and dyes.

The fate of the "history of the arts of painting" was anticipated in a reply to Povey's request for information, by the gentleman gardener and painter, Alexander Marshal (Leith-Ross and McBurney 2000; Iliffe 2012, p. 112), who politely refused to divulge his manner of painting: "The truth is, they are pretty secrets, but known, they are nothing. Several have been at me to know, how; as if they were but trifles, and not worth secrecy. To part with them as yet I desire to be excused" (Birch 1756-1757, 2: 231).[37] The letter highlights the problem inherent in the Royal Society's "History of Trades" project: the unwillingness on the part of practitioners to divulge their trade secrets, even in the name of improvement for King and Country.[38] As with many a well-meant project of this kind, including de Vaux's project of dyes (Birch 1756-1757, 2: 93, 97, 199), the "history of the arts of painting" was never completed (Ochs 1985 and Hunter 1989, pp. 96-101). But Povey remained proud of having reported the distemper recipe to the Royal Society, as he mentioned it again in 1693 when the durability of paintings at Hampton Court was discussed.[39]

If a general history of the art of painting was not to materialize, other discussions about pigments and colorants continued to take place in the Society. Richard Waller, in a paper in *Philosophical Transactions* (1686) made an attempt to codify colour nomenclature by a fixed combination of pigments (Kusukawa

2015), drawing on the work of other Fellows such as Walter Charleton, Francis Glisson and Robert Plot. Plot himself sent to the Society pigments and earths from Aleppo and France (Birch 1756-1757, 4: 179).[40] Nehemiah Grew, furthermore, discussed the chemical principles of colours produced by plants (Birch 1756-1757, 3: 338-39), which informed his later ideas about how indigenous dyes might be improved in order to substitute expensive imports, so as to increase England's wealth (Grew 2012).

Another consideration of the material dimension of images, which also developed out of the history of trades, was the technique of painting on marble. Oldenburg had noted a recipe for sinking colour into marble in Athanasius Kircher's *Mundus Subterraneus* (1665), which he reported in *Philosophical Transactions*, with the example of "Mr Bird", a stone-cutter in Oxford, who knew the technique and whose marble had been broken in front of the King to show how the colours had sunk inside the marble (Oldenburg 1665, p. 127).[41] In 1673, a general call was placed in the journal for information on stones and marbles, among which was the item, "To advance the Art of ting[e]ing white Marbles, so as to make the tincture penetrate and colour them at a considerable depth; and to endeavour to bring this way of colouring to as great perfection, as Enamelling is, by Painting faces and stories, and all kind of Landskips and Perspectives upon white Marble with colours not delible by any thing, that does not destroy the marble" (Oldenburg 1673, p. 6011). In 1676, Prince Rupert sent in "a painting of boys and trees" on a piece of marble. The meeting noted that all its "out-lines" were "exactly defined without any flowing of the colours abroad, and the colours fixed by the fire, and afterwards so polished, that they would be permanent, and

last as long as the marble". The technique, the Fellows remarked, was not entirely unknown, as they recalled the stone-cutter of Oxford, but perhaps in deference to the Prince, it was judged as an "improvement" in how the colours were sunk and fixed (Birch 1756-1757, 3: 280). Staining marble was clearly a point of continued interest, as Henri Justel sent in 1685 a description of the portrait of the French King on "twelve-feet-square marble table top, which was an inch thick, and where the colours appeared to have been sunk into the marble" (Birch 1756-1757, 4: 426). The pursuit of a technique to paint on marble can be considered a Baconian attempt to improve knowledge of colorants so that they could be superinduced on material that had hitherto been assumed to be impossible to tinge or paint upon. The three paintings on stone – two with a landscape and one of a praying woman – kept in the Society's repository (Grew 1681, p. 375) further confirm the Society's interest in placing colour on smooth and hard surfaces.[42]

Furthermore, images made of unusual material or in an unusual way were examined often at the Society. In 1702, the meeting examined pictures of two faces made from butterfly wings collected by "a gentlewoman in Devonshire", and in 1703 a picture of the Virgin Mary from Mexico made of feathers was presented.[43] *Philosophical Transactions* reported that one Elizabeth Pyberg at the Hague was renowned for making paper-cut townscapes as well as portraits of William and Mary (Ellis 1703, p. 1418). Pictures cut out of paper were known to the Society earlier, since the Repository had a picture of a house at the end of the forest with a lion, unicorn, boar, camel and stag cut out of a three-inch square paper (Grew 1681, pp. 378-79; Sloan 2000, pp. 64-67). The Royal Society's interest in unusual images must have been known to those outside the institution,

since a visitor, one Christian Elers, showed a portrait on a pea-sized agate.[44] He claimed that the agate on one side showed a figure of pope Alexander VII, comparing it with his features on a coin, and that the other side showed the face of Emperor Leopold "if the agate were held in one way, but another face held in another way". The Fellows could not, however, discern the faces "imagined by the owner" (Birch 1756-1757, 3: 111).

In 1682, a Nuremberg astronomer Andreas Arnold presented to the Society through Hooke an image of a comet by his friend Georg Christoph Eimmart, done on "blue paper with the heightening of the lights of it by a white laid on, as was supposed, with a pencil", a print by the engraver Susanna Maria Jacobi von Sandrart (1658-1716) made after a painting by Pietro da Cortona (Paas 1995), and a view of the inside of a church in Nuremberg being rebuilt, by Johann Andreas Graff (1636-1701), painter and engraver at Nuremberg (Birch 1756-1757, 4: 131). These gifts may well reflect Arnold's own artistic interests, as he was acquainted with Sandrart and Graff, as well as Godfrey Kneller and his brother Johann Zacharias (Blom 1981, p. 34, 149n61). At least Arnold did not consider it inappropriate to give to the Society a range of images – of artistic or scientific content in different media. In 1685, "Mr Johnson of Canterbury" attended a meeting to show "a curious (i.e. carefully painted) prospect of a cathedral of that city drawn by himself in oil-colours; as also several views of the country adjacent" (Birch 1756-1757, 4: 399). This too suggests at the very least that Johnson believed that the Society would be interested in his painting.

Fellows with different preoccupations had expressed interest at various times in the material aspects of painting (tempera, varnish, pigments, dyes,

staining techniques), as well as images made from unusual material. Such discussions were pertinent to the history of trades, and to a Baconian interest in mastering the material process of making images with and on various material. The perception of those outside the Society seems to confirm the point that the Society was not just interested in images that conveyed scientific content but also in images that demonstrated some kind of mastery of techniques as well as of materials.

3. Identifying painters' hands

Another contribution to the study of paintings arose from a scholar of historical manuscripts, Humfrey Wanley, who would become Fellow of the Royal Society in 1706 (Heyworth 2004). Though primarily a scholar of manuscripts with ambitions to carry out a systematic study of English diplomatic, Wanley declared that he had "always had a great love and affection" for painting as well as for music (Wanley 1989, p. 178). While an assistant at the Bodleian Library, he cast around for donations of paintings, lamenting the fact that its picture gallery could take thousands of paintings, and yet had only a dozen "good" pictures, some done by "pitiful Masters", and no "Histories" or "Landskips".[45] He himself collected drawings and paintings. He owned, for example, a drawing of a "head" of Rubens, and a portrait of Sir Robert Cotton, which he judged to have been painted by William Dobson rather than by Anthony Van Dyck.[46] Acting as Hans Sloane's amanuensis, Wanley also copied out a medieval manuscript at Cambridge, Theophilus's *De diversis artibus,* a handbook on painting which Sloane hoped to have printed.[47]

In 1701, in a letter no longer extant, Narcissus Marsh, Archbishop of Dublin, bibliophile, and oriental scholar, appeared to have asked Wanley whether it was possible to distinguish between an original manuscript and its copy, and determine the manuscript's age by observing only the shape and figure of the letters, and furthermore whether it was possible from such observations to identify works that were now elsewhere and did not bear the author's name.[48] Marsh seems to have asked Wanley whether such a method of attending closely to the visual qualities of script in order to make inferences about its writer could be extended to paintings. In his reply presented to the Royal Society and printed in *Philosophical Transactions*, Wanley stated that it couldn't be much more difficult for somebody to imitate a drawing or a picture than to copy handwriting (Wanley 1989, p. 173). Painters could choose their way of painting and composition at will, so that a painter like Isaac Fuller could produce a painting which even Peter Lely might mistake as "a most incomparable picture of Michelangelo", but Wanley also pointed out that a person generally practised what was most agreeable to "his own genius" so that once a painter's hand was fixed, his manner of drawing became limited (Wanley 1989, p. 178). Thus it was possible for a "curious" person to enter a gallery and identify paintings as by the hands of Riley, Kneller, Van Dyck, Dobson, or Tintoretto, as well as spot copies done after Rubens, Giorgione, Salvator Rosa, Annibale Caracci or Pietro da Cortona (ibid).

To the question whether it was possible to determine at what age the painter had made the painting. Wanley replied that he needed to "experiment" with all the dated works of a "great painter". He noted that Michelangelo, Dürer, or Titian painted no worse later in their lives than they did earlier, but that Antonio

Verrio was reputed to have drawn better in old age according to himself, as he was "almost ashamed of his own works in Windsor Castle painted in the time of Charles II".[49] Yet, Wanley did not believe there was a way to determine the age of a painter, nor of a musician, poet, orator or author from their finished works (Wanley 1989, pp. 178-79).

Marsh also appears to have asked whether a painting could be mistaken for a moving or living thing, to which Wanley replied:

> As to the Painters Painting a Living or Moving thing, so that one shall almost discern the Motion, and see the Bird Flying, or the Horse or Hound Running, etc. that is more easie, especially when assisted by the friendly and pregnant fancy of the Charm'd Spectator. In the Still life indeed, the Eye is quickly deceiv'd and tho they are, as I believe several Masters now living more Excellent at it than ever Zeuxis and Parrhasius were; yet still, with all their Art, 'tis very difficult to impose upon a man so, as to make him believe 'tis not a Picture, but the very Life that he sees before them. (Wanley 1989, p. 175)

Here, as with Norgate and with Evelyn, the active participation of the spectator was acknowledged for appreciating the vividness of painting. The mimetic quality of paintings thus continued to be highly valued, as still life paintings became popular after the Restoration (Batchelor 2016).

Apart from references to Hollar, Streater, Lely and Marshal noted above, records of the Royal Society rarely mention individual painters by their name. Discussion of a painter's identity in relation to his manner or style of painting arose, not from the interest in the material aspects of images, but from antiquarian

scholarship, a topic of continuing interest in the Royal Society. Wanley brought his experience of working with manuscripts to bear on the study of painters' hands, at least in theory. It was a topic that was deemed worth printing in *Philosophical Transactions.*

Portraits

While the study of the material and technical aspects of producing images developed at the initiative of members with a wide range of backgrounds, one group of images came to serve symbolically the institution of the Royal Society as a whole. These were portraits, the most popular genre of paintings in England. Collecting Fellows' portraits was not something that was started deliberately from the beginning of the Society, which may account for why some of the early donations were not formally recorded in the minutes. The idea of a portrait gallery of worthy individuals for commemoration had a long tradition since the Renaissance (Aleci 1998). John Evelyn had advised Edward Hyde, Lord Clarendon, on a series of half-length portraits of contemporary wits for his mansion in Piccadilly (Knight 2004, pp. 151-53).[50] James, Duke of York, commissioned thirteen portraits from Lely in 1666 and twelve paintings in 1675 from Willem van de Velde, father and son, to commemorate naval victories during the second and third Anglo-Dutch Wars (Bird and Clayton 2017, pp. 140-43). At the Guildhall, John Michael Wright (Thomson 2004) had completed a series of portraits of Fire Judges by 1675 (Knight 2004; Evelyn [1955] 2000, 4: 17). Inspired by Evelyn, Pepys commissioned his own series of portraits of contemporary "worthies" (Waals 1984; Liedtke 1991).

It is only from the 1680s that the Society's archives record commissions and donations of portraits, but the practice of portrait-giving can be dated back to 1672, just before the Society was invited back to Gresham College, which had been requisitioned by the City after the Great Fire.[51] According to Hooke's memorandum, the Society met on October 25, 1672, when Jonathan Goddard presented a picture of Edmund Gunter (1581-1626), after which the President William Brouncker, Daniel Colwall, and Goddard himself promised to donate their own portraits (Hooke 1935, p. 11).[52] The donation of a portrait of Gunter, one-time Professor of astronomy at Gresham College, by the Gresham professor of physic, Goddard, might suggest that this might have been related to the Society's imminent return to the College. It may be that Goddard, who was also a Fellow of the Royal College of Physicians, which had once displayed portraits of members or noblemen for £10 (Wolstenholme et al. 1964-77, 1: 459) and which was destroyed in the Great Fire, keenly felt the need for institutions to build their own visual memorial. Goddard died in 1675 without fulfilling his promise, while Brouncker donated his portrait by Peter Lely at the meeting on March 18, 1675, according to Hooke (Hooke 1935, p. 153). The Society met on that day, but the minutes are again silent about this gift, indicating that perhaps at this point the significance of the presentation for the Society had not quite sunk in. We do not know for certain when Mary Beale's portrait of John Wilkins was given to the Society, but it was hanging in the Royal Society by 1677, when Henry Hunt was ordered to make a copy of it (Birch 1756-1757, 3: 331).

With the Library and the Repository installed in the west gallery of Gresham College between 1676 and 1677, perhaps a more permanent sense of the

physical space was dawning upon the Fellowship (Hunter 1989, pp. 140, 142).[53] After a donation in 1680 by John Houghton from his uncle, the arms painter Silvanus Morgan (Cust 2004), of a portrait of the first Duke of Norfolk (John Howard) in colours "nealed on glass" (Grew 1681, p. 380), together with the Howard family's genealogy, the Society seems to have woken up to the possibility of commemorating its donors with portraits. It requested a portrait from the current Duke, Henry Howard, who had lent Arundel House as a temporary home to the Society after the Great Fire and had donated books and manuscripts to the Society's Library. At the same time, the Society asked for a portrait from Daniel Colwall, a merchant who had given £100 to the Society for the Repository (Hunter 1989, pp. 123-55). Colwall only agreed "with much modest reluctancy" (Birch 1756-1757, 4: 16), which was perhaps the reason why he had not sent in a picture earlier, after he had promised to do so in 1672.

In 1680, Hooke asked a foreign member of the Society, Marcello Malpighi, whose studies on plants had been printed in London under the auspices of the Society, to send a portrait with a view to having it engraved (Malpighi 1975, 2: 831-33). Malpighi obliged (Malpighi 1975, 2: 849-51), and his portrait was received in London on January 26, 1681 and a frame for it was ordered (Birch 1756-1757, 4: 67-68). Hooke was asked to arrange David Loggan or Faithorne to make an engraving after the portrait. Hooke was a natural choice to make such arrangements, given his earlier experience supervising an engraving of his former patron Robert Boyle by Faithorne (Maddison 1959, pp. 154-56), but the Malpighi portrait did not materialise. It may also be at Hooke's instigation that in 1681, the newly elected Richard Waller donated a picture of Goddard "done from memory"

(Birch 1756-1757, 4: 100-101). Thus the portraits promised in 1672 were now all in the Royal Society. Waller's portrait of Goddard, most likely a watercolour, was ordered to be "carefully kept with the other pictures of the fellows of the society" (ibid). This tantalizing reference to "other pictures of the fellows" hints that some effort was already under way to collect portraits of fellows in smaller formats, either drawn, or possibly as prints, to be kept together, though no such album has survived intact at the Royal Society. In the case of a mezzotint of Robert Boyle, however, when it was given in 1690 by another Fellow Sir Edmund King, it was not stored with the portraits of the other fellows, but framed and hung up in the Society's meeting room, attesting to the respect he commanded among the fellowship.[54] This mezzotint was probably the one made after Johann Kerseboom's portrait, for which King, who was also Boyle's physician, had persuaded Boyle to sit in 1689, and which was given to the Society after his death, in 1692.[55]

Donation of portraits soon became a recognizable activity at the Society. In 1684, Sir Joseph Williamson (1633-1701) who had served as President from 1677 to 1680 presented his portrait by Godfrey Kneller (Birch 1756-1757, 4: 345). Another portrait by Kneller was presented by Sir Robert Southwell of himself at the end of his tenure as President in 1695.[56] Sir John Hoskyns, as Vice President sent in an engraving of himself in 1703, after which he was asked for another portrait "in oil".[57] Hoskyns had been President from 1682 to 1683, and perhaps there was an expectation that a president's portrait ought be in oil, but Hoskyns in the end did not present such a portrait. These examples in the early years of the Royal Society suggest that donations of portraits by Fellows were voluntary, and

the kind of portrait to be given was up to the Fellow himself. Portraits of fellows could also be presented by another fellow, as in the case of Federick Slare's gift of a portrait of Theodore Haak, soon after the latter's death in 1690.[58] More commonly, family members gave portraits of Fellows posthumously: John Wallis's portrait was given by his son in 1704 and John Evelyn's by his widow in 1708.[59] As a rule, these were donations for which the Society did not pay, except occasionally for the frames.

The Society also hung portraits of those who were not members of the Society. On February 27, 1684, Haak presented a portrait of a correspondent of the Society, Johann Christoph Sturm (1635–1703) of Altdorf, and John Mapletoft a portrait of William Harvey, both of which were ordered to be hung in the meeting room (Birch 1756-1757, 4: 261; Keynes 2006) . Harvey (1578–1657) had posthumously become a significant hero (Jordanova 2018, pp. 36-41) for the Society, whose work on circulation was extended to transfusion experiments. By 1690, the Society also had a portrait of Thomas Hobbes, given by John Aubrey.[60] This may be somewhat surprising, given the ill-tempered dispute Hobbes had with Fellows such as John Wallis. In January 1696, another portrait of Harvey was presented by Povey along with one of George Buchanan (1506-1582), the Scottish historian.[61] These were originally included in Povey's sale of paintings to his nephew, William Blathwayt, but either Blathwayt did not want them or Povey had second thoughts about their appropriate home.[62] Povey in addition presented an engraving of Buchanan, which he asked to be glued onto to the back of Buchanan's portrait. This was probably the engraving done by Robert White in 1690 which carried the inscription that it was made after the "true image (vera effigies)" in

Povey's museum.[63] Though the print is no longer present, having it glued onto the back of the portrait would have ensured that it marked the donor. This anticipated the sentiment expressed in the Society's orders later on that the names of the sitter, donor, and painter should be recorded on the paintings, lest they be "forgotten".[64] In 1703, a portrait of the antiquarian Henry Spelman (1562-1641) was given by one of his descendants to the Society through John van de Bemde.[65] Both Buchanan and Spelman belonged to a generation well before the foundation of the Society, but were considered important English authorities in the field of history and of antiquaries respectively (Evelyn 1697, p. 260). Such additions of portraits of non-Fellows, which continued after the Society's move to Crane Court, suggests a wider sense of an intellectual genealogy rather than just of the Society itself. Furthermore, a visiting dignitary, the Venetian ambassador Cornaro, gave a mezzotint print of himself to mark his visit in 1708. The print was duly ordered to be framed, and was hung in the meeting room.[66]

The walls of the meeting room at Gresham College must have been crowded before the Society's move in 1710, as there hung half-length canvases (c. 50 x 40 inches) of Wilkins, Brouncker, Williamson, and Boyle; three-quarter format portraits (c. 30 x 25 inches) of Harvey, Evelyn and Haak; smaller portraits of Sturm, Buchanan and Spelman; and framed mezzotints of Boyle and of Cornaro. In fact, by 1708, the Society had received two more portraits whose donations were not formally recorded, namely those of Edmund Halley and of Samuel Pepys (Hatton 1708, 2: 666). These portraits were flanked by other items which had been ordered to be put up on the wall, such as Waller's colour chart in 1687 (Birch 1756-1757, 4: 459), Hooke's barometer in 1695, a drawing of the Giants Causeway

in 1697, a map of Halley's voyages in 1701, Wren's ground-plan of St Paul's in 1703, and a picture of a "urus" sent by Gottfried Wilhelm Leibniz in 1705.[67] It is possible that it was also in the meeting room that the print of the Royal Exchange, for which Hooke was paid 10 shillings, was hung.[68]

The display of portraits of Fellows and other past and present "worthies" alongside images examined at the meetings of the Royal Society helped to create a visual memorial for an institution which had from its beginning worried about its permanence, and wanted not to be "forgotten".[69] Not all paintings and hangings have survived (Moore 2013), but the cumulative effect of individual donations was the emergence of a tradition, to build a visual identity of the institution.[70]

Conclusion

Thomas Kirke, a Fellow of the Royal Society who owned a copy of Norgate's "Miniatura", learned to draw by copying prints, and he turns out to have been fairly competent at it, when he copied out an illustration from *Philosophical Transactions* (fig. 5. Thomas Kirke's copy in pen and ink of the engraving for issue 170 of *Philosophical Transactions* (1685), signed bottom left "TK delin[eavit]. 1695", Trinity College Library, Cambridge. Ink on paper, 193 x 300 mm (frame). © By kind permission of the Master and Fellows of the Royal Society.). Kirke further hoped to "better his judgement" on collectable prints by accompanying William Lodge around London's printsellers (Hake 1922, p. 62). Similar examples may be found with other fellows: Sir Kenelm Digby learned about mixing colours from Rubens and Van Dyck (Leonhard 2017); the painter John Hayls (Hearn 2004) took Pepys around the Whitehall galleries, showing him how to "distinguish and

observe the workmanship" in paintings, which resulted in Pepys's realisation that some paintings were not as good as he had previously thought, and helped him appreciate Hayls's paintings as "very good" (Pepys 1970-1983, 7:97). Engravers and painters thus guided the visual training of members of the Society who were also aspiring collectors. In fact, they had much more to offer than the edification and training of their clients' eyes. We have already seen how Streater's studio became an impromptu site for experimenting with distemper. Painters' studios were also important meeting places. It was because Petty was proficient in drawing, according to Aubrey, that he became acquainted with the miniaturist Samuel Cooper, and through Cooper, came to know Hobbes (Aubrey 2015 2: 763).[71] Quite a few painters, including Lely (Detholff 2002) and Wright (Evelyn [1955] 2000, 3: 372) were also collectors, and painters' proximity to the powerful because of their commissions made them useful social contacts.[72] Just as coffeehouses and print shops have been noted as relevant social contexts for the communication and conduct of experimental natural philosophy at the Royal Society (Johns 2006), painters' studios too should be acknowledged among the networks through which members of the Royal Society moved (Archer 2000).

It is also worth recalling that the first (and last) publication in which the Royal Society was financially involved in its first fifty years was a lavishly illustrated book on the natural history of fishes, *Historia piscium* (1686). It was a collaborative project in that the incomplete and image-less notes left by Francis Willughby on his death had to be completed and edited, images had to be sourced and engraved, and paper and printing had to be organised by Fellows such as Martin Lister, John Ray, Philip Skippon, and Francis Aston (Kusukawa 2000). The

main source of images for *Historia piscium* was Hippolito Salviani's *Aquatilium animalium historiae liber primus* (1554) (Kusukawa 2014). This choice may well have been due to the fact that Skippon, travelling with Willughby and Ray, had seen in 1665 at the famed museum of Cassiano dal Pozzo "Salvianus's fishes done to the life in miniature" (McBurney et al. 2017, 2: 485-6). Pepys, who was President of the Royal Society at the time of the publication, made the largest individual contribution to the subscription of illustrations. He may have felt that given his position and the increasing financial burden of the project on the Society, he should lead by example, but it may also have been a personal endorsement of a large, lavishly illustrated book, because of his keen interest as a collector and patron of artworks.

Being able to appreciate a good print or painting and being a Fellow of the Royal Society required knowledge and appreciation of the processes of making images. A variety of unusual images were examined for their material techniques and manufacturing process at the meetings of the Royal Society. An interest in palaeography led to musings about painters' identity through their handiwork. The gentleman-etcher, Hollar, was highly regarded, and Kneller was a favoured painter by whom Fellows could leave a visual legacy of their membership at the Royal Society. Those outside the Royal Society had the impression that its members cared about, or at least were interested in images. It would be misleading to state that there was a coherent set of visual values unique and observable in every member of the early Royal Society, just as it would be misleading to claim that they were wholly uninterested in images. Such heterogeneity should not surprise us, given how varied the activities and

publications of the Royal Society were in its early years. Such heterogeneity is evidence, in fact, of the multiple ways in which Fellows of the Royal Society engaged with visual culture.

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[2] Limning: painting in watercolour or distemper, OED.

[3] For a useful historiographic overview of the study of images in history of science, see Marr 2016.

[4] Privately, Lhuyd expressed a more positive view, when he called Jones "my best designer" (Gunther 1945, p. 372).

[5] Not all drawings related to the Royal Society have survived at the Society (Kusukawa 2013).

[6] James Mynde (whose name turns up as early as 1744 in MM/20/14) is called 'the Society's Engraver' in 1761, CMO/4/129, Royal Society Archives [RSA hereafter].

[7] Evelyn turned down Barlow's request for support (Evelyn 1870, pp. 597-99 (1656)), though he owned a couple of his drawings (Hunter and Bennett 2017, 53n24).

[8] JBO/11/11 (watercolours from China); Cl.P/4i/16 (hail); Cl.P/3i/16 (instrument), Royal Society Archives [RSA hereafter].

[9] The stones were donated in 1666, with the mother reserving the right to recall them (Birch 1756-1757, 2: 81).

[10] AB/1/1/3 (1683-1722), RSA; cf. Birch 1756-1757, 4: 316.

[11] Aubrey 2015, 2: 845 for Prince Rupert's draughtsmanship; for the series of six plates, see Hollar 2009-2012, 7: 14-22 (nos 1920-25). For Hollar's connections with Evelyn and Aubrey, see ibid. 9: xxxvii-xliv.

[12] I have chosen not to discuss Evelyn's translation of Fréart's tract on architecture, *Parallel between Ancient and Modern Architecture* (1664), because the limited direct discussion of this work at the Royal Society. Evelyn's own "Account of Architectures and Architecture" appended to this translation, and its relation to the Royal Society are discussed in Walker 2017, pp. 36-53.

[13] For Bacon's reconfiguration of the traditional art/nature distinction, see Newman 1998; Weeks 2007.

[14] For the tradition of operative knowledge, see Pérez-Ramos 1988, and Bacon's idea of "interpretation", Serjeantson 2014.

[15] Note that Evelyn was not the only person associated with Hartlib who was interested in graphic techniques, since a translation of Abraham Bosse's *Treatise of Graving and Painting (Sentiments sur la distinction des diverses manieres de peinture, dessin et gravure et des originaux d'avec leurs copies*) had been planned with John Pell's comments and Wenceslas Hollar's images (Pell 2005, p. 142), though it did not materialise. For Evelyn's source for the "cycle of arts", Giacomo Mari Favi, see Sorbière 1660, pp. 651-52, as noted in Hobbes 1994, 1: 554n6.

[16] Evelyn's list, Cl.P/3i/1, RSA (transcribed in Sieveking 1923), was to be harmonised with William Petty's list (Petty-FitzMaurice 1927, 1: 206-7), which were not grouped into any order of social hierarchy, but did include: "Of painting, coulers and oyles. Gums, waters, varnishes, lackers. Tinging metals, glasses and stones…. Typography, in writing, printing, etching, graving, stamping, casting, molding."

[17] Evelyn's own preference for "virtuoso" arts is noted in Hunter 1995, p. 80.

[18] Drawing, as an intellectual and virtuous exercise fit for a gentleman was by this time a well-known trope (Sloan 2000). Evelyn himself drew and valued drawings by his wife and daughter (Gibson-Wood 2003, p. 233).

[19] This draws on the well-established distinction between internal/external 'disegno' Summers 1987, pp. 306-7; Kemp 1974; Baxandall 1990.

[20] This draws on the correlative concepts of "naer het leven" and "uyt den gheest" as canonized by Karel van Mander, Melion 1991.

[21] For licit types of magic by this time, see for example Wilkins 1648, Van Dyck and Vermeir 2014.

[22] I owe information about Couvay to Andrea Immel's post at: https://blogs.princeton.edu/cotsen/tag/couvay-despautaire-en-tables/. Evelyn probably came across this tract while in France, but his description of this work as a "hieroglyphical" grammar also echoes the idea promoted by Hezekiah Woodward (1641, p. 13), a close associate of Samuel Hartlib.

[23] For Comenius and Hartlib, see Greengrass 2004.

[24] However, see a similar proposal of a visual archive by Gottfried Wilhelm Leibniz, Bredekamp 2007.

[25] This echoes the period sense of pointing out a general principle through an instantiation of something concrete: "I have *ad oculum* demonst[r]ated with a company of bullets, and some few other very simple bodies; so that there was not any regular Figure, which I have hitherto met withal, of any of those bodies that I have above named, that I could not with the composition or bullets or globules, and one or two other bodies, imitate, even almost by shaking them together". Hooke 1665, p. 85.

[26] Povey was chairman of another committee, for "Correspondence", which had fallen defunct after he had entertained them, Hunter 1989, pp. 93-94. 112 paintings were listed in D 1799/E248, prepared for sale by Povey, together with his books, to his nephew, William Blathwayt for £500, 8 November 1693 (Povey would have been eighty then). For the bargain and sale, see D 1799/E247, which includes a notebook listing Povey's books, Goucestershire Archives. Some, though not all of Povey's paintings, have survived at Dyrham Park (Walton 1986).

[27] For example, Pepys 1970-1983, 4: 17-19 and Evelyn [1955] 2000, 3: 375. It is Povey who nominated Pepys to the Fellowship of the Royal Society.

[28] My summary of the August meeting has been supplemented with information from Povey's fuller account of it in December 1667, Cl.P/2/24 and RBO/3/69, RSA, printed in Birch 1756-1757, 2: 227-30.

[29] Povey's paintings included 58 portraits, 17 still lives, 15 landscapes and buildings, and 14 with religious or classical themes. D1799/E248, Gloucestershire Archives.

[30] For Charles II's effort to memorialize his father and recover the dispersed art collection of his father, see Bird and Clayton 2017, pp. 1-14, 213-14.

[31] JBC/8/252, RSA.

[32] PROB/11/435/1_2 (1696), the National Archives.

[33] See also his interest in glass painting, Henderson 2019.

[34] For recent scholarship of pigments and material dimensions of colour, see Baker et al. 2015, Bushart and Steinle, 2015, Feeser et al. 2012.

[35] See also the role of William Harvey as an art agent for Thomas Howard, Howarth 1985, p. 124.

[36] PROB/11/421, the National Archives.

[37] Marshal wrote from Castle Ashby, the seat of the Earl of Northampton, Povey's neighbor in Lincolns-Inn Field (Murison 2004).

[38] This was anticipated by Evelyn, Hunter 1995, p. 81.

[39] JBC/8/183-184, RSA.

[40] Newton's use of painters' colour terminology in his optical papers (Shapiro 1994) is further confirmation of how the visual worlds of "art" and "science" were not stratified nor mutually exclusive in this period.

[41] Oldenburg's notes from Kircher are at Cl.P/2/23, RSA.

[42] Note that Grew's catalogue of the repository did not list its portraits or paintings, as noted in Henderson 2019.

[43] JBC/9/291 (butterfly), JBO/11/21 (feather art), RSA.

[44] For the Society's interest in agate, see Keller 2018, pp. 109, 113. For Elers, see further Henderson 2019.

[45] Wanley to Edward Owen, 16 April 1696, Wanley 1989, pp. 30-32 (no. 18) and to Henry Puckering, 3 June 1696, ibid., pp. 38-39 (no. 23).

[46] For the drawing of Rubens, see his letter to Robert Harley 6 July 1703 (no. 100), Wanley 1989, p. 220; and for Cotton's portrait, 19 October 1703 (no. 103), ibid. p. 232.

[47] JBO/10/221, RSA.

[48] Jean Mabillon's *De re diplomatica* (1681) had introduced the idea of dating historical documents and manuscripts by various means.

[49] For his Windsor paintings, see Heyworth 1989, pp. 174-75. The source of this information is unclear. For Verrio, see Brett 2009/10.

[50] An undated list of 83 portraits, with indication of size, at Cornbury House is found in British Library, Add MS 4459, fol. 100r-100v. See also Evelyn's letter to Pepys, 12 August 1689, Evelyn 1870, pp. 690-703.

[51] Birch 1756-1757, 2: 114f. (12 September 1666), 3: 113 (27 November 1673).

[52] The Society first met after the summer recess on 30 October 1672 according to the Journal Book (Birch 1756-1757, 3: 57), but informal meetings appear to have been taking place on 4, 11 and 18 October (Hooke 1953, pp. 9-10). It should also be noted that the Royal Society's Journal Books are not a complete or comprehensive record of the meetings (Kaye 1951, Feingold 1998).

[53] This is also after plans for a purpose-built College were abandoned, Hunter 1989, pp. 156-184.

[54] The mezzotint was by John Smith, published by Edward Cooper, after Johann Kerseboom (1689), for which, see for example, National Portrait Gallery, D780. Maddison 1959, p. 161; Hunter 2009, p. 228. King offered a painting of a former president (John Micklethwait) to the Royal College of Physicians in 1682 (Wolstenholme et al. 1964-1977, 2: 6).

[55] JBO/9/100, RSA.

[56] JBO/9/196, RSA.

[57] JBO 11/30-31, RSA.

[58] JBO/9/11, RSA.

[59] JBO/11/47, 134.

[60] A letter from John Aubrey to Thomas Hobbes, 30 August 1661 (Hobbes 1994, 2: 521n3 (no. 143)) notes that this portrait was the one by Cooper) indicates that Aubrey had commissioned a portrait by then. From his notes for Hobbes' life (Aubrey 1898, vol. 1: 354), Aubrey drafted a Latin note of dedication which dated a portrait of Hobbes by Jan Baptist Jaspars to 1663 and he noted that he had given the portrait to the Society "12 years since". 26 November 1690, "Dr Mapletoft being present was put in mind, of what the Society had desired of him the last day, about some Inscriptions to be put upon the Pictures of the Bishop of Chester, the Lord Brounker, Mr Hobbs & Mr Haak. He excused himself and desired that Dr Gale (who was present) would please to do it. Whereupon the Society requested it of them both, as they should think fit between themselves." JBC/8/18, RSA.

[61] JBC/8/328, RSA.

[62] JBO/10/7. For Povey's paintings, see note 29 above.

[63] For this engraving, see for example National Portrait Gallery, London, D25505; for White, see Griffiths 2004e.

[64] JBC/8/329, RSA.

[65] JBO/11/42, RSA.

[66] JBO/11/159, RSA.

[67] JBC/8/317 (barometer), JBO/10/56 (Giants Causeway), JBO/10/221 (Halley's maps), (JBO/11/15 (St Paul's), and JBO/11/68 (Leibniz), RSA. The picture of Urus was obtained from Leibniz and Lord Raby earlier, for Dr Aldrich Dean, to be copied and printed in his commentary on Caesar, as noted in the minutes of 22 November 1704, 6 December 1704, 24 January 1705, JBO/11/58, 63, RSA. For the cost of the picture and the frame, Sloane was reimbursed 20 sh. 6 d. in April 1705, AB/1/1/3. For Renaissance discussion of the identity of Caesar's "urus", see Pinon 2005, pp. 252-53.

[68] AB/1/1/3, RSA.

[69] For the search for stability in the early years of the Society, see Hunter 1989, pp. 1-15.

[70] The development of the convention of donating portraits followed a similar path at the Royal College of Physicians, which became regularized under Hans Sloane in the eighteenth century (Wolstenholme et al. 1964-77, 2: 6-10).

[71] This is somewhat contradicted by Aubrey's report that they knew each other in Paris where they studied anatomy together, and that Petty had drawn the figures for Hobbes's optics (Aubrey 2015, 1: 43)

[72] See Evelyn's meeting with the King while the latter was sitting for Cooper (Evelyn [1955] 2000, 3: 309-10). Kneller's discussion of the legitimacy of James Francis Edward, Prince of Wales, took place at David Gregory's house where Kneller was painting the portrait of John Wallis for Pepys (Hiscock 1937, pp. 11-12).